DISSERTATION AT YASHODA SUPERSPECIALTY HOSPITAL, KAUSHAMBI

By

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Dissertation

At

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Improvement of Patient Discharge Process in a Hospital Using DMAIC

By

Kriti Rastogi

Under the guidance of

Dr. BS Singh

Post Graduate Diploma in Hospital and Health Management

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International Institute of Health Management Research

New Delhi

YASHODA
SUPERSPECIALITY HOSPITALS

NABH

The certificate is awarded to

Name KRITI RASTOGI

In recognition of having successfully completed her
Internship in the department of

ADMINISTRATION

and has successfully completed her Project on

"IMPROVEMENT OF PATIENT DISCHARGE PROCESS IN A HOSPITAL USING DMAIC"

Date 01-05-2014

Organization YASHODA SUPERSPECIALITY HOSPITAL, KAUSHAMBI

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish her all the best for future endeavors

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TO WHOMSOEVER MAY CONCERN

This is to certify that Kriti Rastogi student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at Yashoda Superspeciality Hospital, Kaushambi from 4th Feb'14 to 4th May'14

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements. I wish her all success in all his future endeavors.

08/05/2014

Dr. A.K. Agarwal
Dean, Academics and Student Affairs
IIHMR, New Delhi

Name of mentor
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Certificate Of Approval

The following dissertation titled **"IMPROVEMENT OF PATIENT DISCHARGE PROCESS IN A HOSPITAL USING DMAIC"** at **"YASHODA SUPERSPECIALTY HOSPITAL, KAUSHAMBI"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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(3)	Dr. B.S. Singh.	

Certificate from Dissertation Advisory Committee

This is to certify that **Ms. KRITI RASTOGI,** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled "IMPROVEMENT OF PATIENT DISCHARGE PROCESS IN A HOSPITAL USING DMAIC" at "YASHODA SUPERSPECIALITY HOSPITAL, KAUSHAMBI" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr BS Singh,
Assistant Professor
IIHMR, New Delhi

Dr. Sunil Dagar
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INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

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This is to certify that the dissertation titled Improvement of Patient Discharge process in a hospital using DMAIC

and submitted by Kriti Rastogi Enrollment No. PG/12/038

under the supervision of Dr. B.S. Singh

for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 4th Feb'14 to 4th May'14

embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Kriti

Signature

FEEDBACK FORM

Name of the Student: KRITI RASTOGI

Dissertation Organisation: YASHODA SUPER SPECIALITY HOSPITAL
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GHAZIABAD

Area of Dissertation:

Attendance: Regular

Objectives achieved: Achieved learning of process.

Deliverables: Desired SOP of process

Strengths: Adaptable

Suggestions for Improvement:
- Scope of learning
- Analytical Skills
-

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 04-05-2014
Place: Kaushambi

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ABSTRACT

Introduction

In the simplest form possible, and for any inpatient, their total hospital experience can be described into three distinct phases; admission, intervention, and discharge. In which, discharge plays a great role in providing patient satisfaction.

Discharging patients from the hospital is a complex process that is fraught with challenges. It involves development of an individualized discharge plan for the patient prior leaving the hospital, to ensure that patients are discharged at an appropriate time and with provision of adequate post-discharge services. Such planning is a mandatory part of hospital accreditation and seeks to determine the appropriate level of services required by the patient and then match the patient to an appropriate site of care. The process ideally begins at the start of the hospitalization and move forward along with the delivery of patient care services. The hospital case manager should be involved as soon as it is clear that the patient will require services at home, or will require transfer to an alternative level of care.

Rationale

Presently hospitals in India are experiencing ongoing pressure to provide satisfactory care and the resources involved are having trouble realizing expectations. Hence give rise to the need for identifying various reasons occurring in hospitals that impede patient flow and patient satisfaction.

Objectives

1. To understand in depth the patient discharge process in the hospital and to analyse the working plan and discharge model.
2. To determine the possible methods for improving and sustaining the changes in discharge process.
3. To minimize the discharge time and increase the patient satisfaction.

Methodology

The study was conducted in Yashoda Super-Speciality Hospital, Kaushambi. The study design was descriptive cross-sectional design & convenience sampling method was used. In-Patient feedback forms (secondary data) that are given to the patients at the time of discharge as well as discharge tracking sheets were analysed and DMAIC approach was used to improve the patient discharge process. The attributes related to discharge process in IP feedback form were considered: (1) Timely discharges as per the time frame informed to you; (2) Timely & accurate billing was done & explained; (3) Post discharge instructions & medications were well explained.

Firstly, the three aspects of DMAIC i.e. define the process, measure the process variations and analyse the problem by doing RCA, was done and feedback forms was collected for the period of Dec'13 to Feb'14 and then the last two aspects of DMAIC i.e. implement the solutions and control or sustain the changes done in the process, was done for a period of two months i.e. from March'14 to April'14.

Results

After analysing the feedback forms (1022) for the period of Dec'13-Feb'14, patient satisfaction related to discharge process came to be 73% and TAT for discharge process for the month of March'14 was 179 mins and for April'14 it was 168. Out of the three parameters of discharge process it was observed that "timely discharge as per the time frame informed to you" has scored the least (7) whereas "post discharge instructions & medications were well explained" has scored the highest (8). Most of the complaints were being raised because of the long discharge process, slow billing process, bad experience with TPA staff; no proper information regarding discharge was given. Higher TAT was due to slow billing process, delay in getting approval from TPA, delay in making discharge summary, waiting for baby's discharge notification.

Conclusion

In this project, DMAIC approach was applied to streamline patient discharge at the hospital. Several tools are used including process mapping, Pareto charting, RCA and FMEA to analyze and solve the problem. It was found out that after following the recommendations, reduction in the average discharge time from 3hrs to 2 hr 49 mins was seen in few days.

ACKNOWLEDGEMENT

This study is an accomplishment due to the timely help and constant support of several people. I take this opportunity to express my gratitude towards all those who have been instrumental in the successful completion of this endeavor.

I am highly indebted to **Mrs. Upasana Arora**, Director, Yashoda Super-specialty Hospital, Kaushambi, for having permitted me to carry out this project in their esteemed organization.

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Kriti Rastogi

LIST OF FIGURES

LIST OF ABBREVIATIONS

IP	In-patient
OP	Out-patient
DPMO	Defects Per Million Opportunities
DMAIC	Define Measure Analyse Improve Control
DMADV	Define Measure Analyse Design Verify
FOE	Front Office Executive
DAMA	Discharge Against Medical Advice
RCA	Root Cause Analysis
FMEA	Failure Mode Effect Analysis
UHID	Unique Hospital Identification
DPO	Defects Per Opportunity
DOR	Discharge on Request
YHK	Yashoda Hospital Kaushambi
TAT	Turn Around Time

ORGANIZATION PROFILE

Yashoda Superspeciality Hospitals, Ghaziabad is a name synonymous with advance and world class patient care in NCR of Delhi. Having a humble beginning around 20 years ago at Nehru Nagar, Ghaziabad, the institution has now grown to become a major tertiary care healthcare provider to all walks of life in the region. Presently, Yashoda Superspeciality Hospitals operate from two locations, Nehru Nagar with 300 beds and Kaushambi with 100 beds in Ghaziabad which are easily accessible by road and rail.

Yashoda Superspeciality Hospitals has been pursuing the aim to deliver world-class patient care services in a comprehensive manner to every individual with an emphasis on quality, service excellence, empathy and respect. In all its endeavors, it continuously strives to upgrade its facility and equipments to match world class standards and consistently investing to make available latest medical technologies. In addition to all general specialities, it has varied range of Superspeciality services i.e. Cardiology, Endocrinology, Gastroenterology, Nephrology, Neurology. Pulmonology, Urology, Neurosurgery, Plastic and Reconstructive Surgery. The centre at Nehru Nagar has in addition fully operational Nuclear Medicine department and a state of the art Cardiac Cath Lab for Interventional Cardiology and Cardiothoracic and Vascular Surgeries. It also has state of the art world class seamless operation theatre complex with HEPA filters and laminar flow. Both the institutions have constant support from well qualified and professional Consultants, Residents, Nurses, Technicians, Administrative and Support staff. The hospitals have well equipped critical care units and haemodialysis facility. The hospitals have its own fleet of ambulances including ICU ambulances for transportation of critically ill patients.

Both institutions have advanced diagnostic facilities including CT Scan, Ultrasonography, Mammography, Routine Radiology, ECG, EEG, NCV & EMG, TMT, ECHO, Colour Doppler, Holter Monitoring, PFT, Diagnostic Endoscopy. Fully Automated pathology, Microbiology, Cyto & Histopathology. In addition, Nehru Nagar centre has MRI and Nuclear Medicine facility. Both institutions have Blood Banks and Component services. Nehru Nagar, in addition has Apheresis Unit.

Yashoda Superspeciality Hospital, Kaushambi became operational in the year 2006 with 100 beds to cater for the healthcare needs of the population residing in the area adjoining Delhi. The facility was created to provide comprehensive medical care under one roof while maintaining the highest standards of medical excellence.

Yashoda Superspeciality Hospitals have designed comprehensive preventive healthcare packages covering the varied requirements of all age groups. The Health check-up packages are flexible enough to accommodate the specific requirements and can be tailor made to suit particular organization. It also provides pre-employment health checks at affordable costs.

Yashoda Superspeciality Hospitals are an ISO 9001: 2008 certified organizations and Kaushambi has been accredited with the highest recognition for hospitals in India from NABH. The institution has carved a niche in short span of time and is rendering yeomen services to the community.[1]

QUALITY POLICY

Yashoda Super Specialty Hospital is a tertiary care hospital with focus on providing world class and holistic healthcare services with excellence in multi specialties to treat patients with respect, compassion, dignity and ensuring their safety by complying with all legal requirements &

significant environmental aspects to maintain adherence with ***NABH*** *standards* through continuous quality improvement.

QUALITY OBJECTIVES with SERVICE STANDARDS

- To focus on Quality of patient care.
- To improve the performance of all professionals in patient care
- To monitor, measure, assess and improve performance and to enhance patient satisfaction.
- To guard, measure and improve patient safety.
- To inculcate an excellent hygienic treatment process
- To involve all employees to participate in improving Quality
- To search for pattern of non-compliance with goals, objectives & standards through:
    a. Problem identification
    b. Problem assessment
    c. Finding the root cause
    d. Solution Generation
    e. Plan for the solution implementation
    f. Implementation of corrective action
    g. Monitoring[1]

SCOPE OF SERVICES PROVIDED AT YASHODA SUPER SPECIALITY HOSPITAL

SUPER SPECIALTIES

- Cardiology
- Endocrinology and Metabolic diseases
- Gastroenterology

- Joint replacement
- Nephrology
- Neurology
- Neurosurgery
- Plastic, Cosmetic surgery & Reconstructive Surgery
- Pulmonology
- Urology

GENERAL SPECIALTIES

- Anesthesiology
- Audiology & Speech Therapy
- Critical Care Medicine
- Dentistry
- Dermatology
- Dietetics
- ENT
- Internal Medicine
- Minimal Access & General Surgery
- Obstetrics & Gynecology
- Ophthalmology
- Orthopedics
- Pediatrics & Neonatology
- Physiotherapy
- Psychiatry, Clinical Psychology & Psychotherapy

SPECIAL CLINICS

- Preventive Health Checks

24 HR SERVICES

- Blood Bank
- Emergency & Trauma Care Services

- Laboratory Services
- Pharmacy Services
- Radiodiagnosis Services

Services not available at Hospital

- Heart Transplant
- Stem Cell
- Organ Transplant
- Oncology
- CTVS
- Nuclear Medicine
- Interventional Cardiology.[1]

Tasks performed at the organization

- Involved in morning and evening rounds in wards
- Liaising with consultants, housekeeping, F&B, maintenance, IP billing deptt, TPA desk for smooth discharges of patients.
- Handling day to day issues on floors and providing solutions for the same.
- Daily discharge reports and reasons for delay in discharge of the patients
- To ensure high quality and patient satisfaction

Key Learning

- Thorough understanding of the admission and discharge process.
- Learned different quality tools (RCA, FMEA) to analyze the data like feedback forms and discharge tracking sheets.
- Understanding of all the services available in the hospital
- Understanding of functioning of TPA department in the hospital.

INTRODUCTION

In the present competitive world, quality of health care is playing an important role in the modern society. Among various factors affecting the health care system, discharge process is one of the important factors related to patient satisfaction. It is the process that occurs when the patient leaves the facility. It implies that the patient has previously been admitted to the facility. As the final step in the hospital experience, the discharge process is likely to be well remembered by the patient. Even if everything else went satisfactorily, a slow, frustrating discharge process can result in low patient satisfaction. It is an important area which touches the patients' emotion; influence the image of the hospital and patient satisfaction. Therefore, the demand for effective health services is ever increasing. Mogli defines "discharge as the release of a hospitalized patient from the hospital by the admitting physician after providing necessary medical care for a period deemed necessary".[2]

The timing of and events surrounding hospital discharge can have a significant impact on patient satisfaction, patient safety, and the outcomes and cost of care. A growing body of research on optimizing discharge strategies and improving communication at discharge can inform the discharge decision. Several strategies, including structured patient education, pre-discharge checklists, multidisciplinary discharge planning teams, post discharge telephone follow-up, and improving communication methods between IP and OP providers during discharge, have been shown to enhance the discharge process.[3]

The motive of timely discharge is not limited to cost considerations. For many patients, the simple unpleasantness of the average hospital room, the lack of privacy, and the human desire to sleep in one's own bed are motivation enough. In addition, patients and families have become

aware that the risk of medical errors and nosocomial infections make the hospital a potentially dangerous place.[3]

Discharging patients from the hospital as quickly as possible has its own risks. The subsequent period-from hospital discharge to full recovery-is often traumatic and confusing for both patients and families. After discharge, many patients still feel unwell and yet are expected to follow-up visits and tests. The growth of the hospitalist model means that the IP and OP providers are often different individuals, which may lead to miscommunication between providers and add to the patient's anxiety over the transition out of the hospital. Finally, for many patients, the costs of hospital care are fully borne by third-party payers, while costs of skilled nursing or home care must be covered partially or completely with personal resources.[3]

In the past, a physician's decision to discharge a patient was often governed by intuition and experience. In the past decade, high-quality studies have come to provide a scientific basis for many discharge decisions. To optimize the hospital discharge process, the focus should be on: (1) improving patient safety; (2) enhancing communication and follow-up; (3) facilitating discharge planning.[3]

STRATEGIES FOR EFFECTIVE DISCHARGE

To optimize the effectiveness of the discharge, communication at discharge and follow-up must be enhanced. Communication gap are common at the time of hospital discharge, yet physicians and nurses tend to overestimate patient's comprehension of discharge treatment plans. Although communication is a core skill for physicians, many patients have difficulty understanding what physicians tell them. This is particularly a problem for patients who have inadequate health

literacy. Health literacy have been defined as the ability to read and comprehend prescription bottles, appointment slips, and written discharge instructions. Several strategies, including structured patient education, post-discharge telephone follow-up, and communication improvement between IP and OP providers, and multidisciplinary discharge planning teams, have been shown to improve communication at the time of discharge and may yield more satisfied patients.[3]

Patient Safety

Hospital discharge is often a chaotic and potentially dangerous time for both patients and providers, ripe with opportunities to improve both patient outcomes and satisfaction. Functional limitations may persist and make patients especially vulnerable to injuries with the increased activity of the pre-discharge period. Particularly in hospitalist system, the transition from IP to OP care may become fraught with miscommunication and inadequate follow-up.[3]

Many of the adverse events that occur frequently during the post-hospital period are preventable or ameliorable. The most common events are adverse drug events, but harm may also come from unaddressed laboratory abnormalities. Changes in system design can improve patient safety during the pre-discharge period and should focus on four areas: (1) evaluating patients at the time of discharge; (2) educating patients about drug therapies, side-effects, and actions to take if specific problems occur; (3) strengthening monitoring of therapies; and (4) improving monitoring of patient's overall condition.[3]

Structured Patient Education

Hospital discharge is a critical transition zone, from a time when all care is delivered by hospital staff to one in which the patient, and possibly family, are entirely responsible. Making this transition safely depends on high-quality, structured patient education. Too often, however, such education is neglected, in part because unrecognized barriers interfere. Hospital physicians need to appreciate patient's capability to assimilate discharge instructions. Although providers usually assume patients comprehend their written and oral explanations of illness, several studies have shown that health literacy is often worse than providers think. Many health materials, including patient education brochures, discharge instruction sheets, and informed consent documents, are written at levels far exceeding patient's reading abilities.[3]

The terminology or language health care providers use in communicating with patients is a significant barrier for patients who have inadequate health literacy. Physician's facile overuse of medical terms, combined with patient's limited health vocabulary, results in inadequate and even confusing communication. Unfortunately, patients with low health literacy tend to ask fewer questions, even though they may feel overwhelmed with information and lack understanding.[3]

Checking to ensure that the patient's history is accurate and that the patient understands the physician's instructions are the most important interviewing skills. Unfortunately, they are also the least utilized. Written materials can be used to augment patient education, but video and computer multimedia programs are even more powerful interventions. Pictographs (simple pictures that represent ideas) markedly enhance recall of spoken medical instructions among all patients. Using pictographs as visual aids (e.g. Simply drawing a picture related to what you

want the patient to remember) can more than quadruple patient's ability to recall important medical information.[3]

Post-discharge Telephone Follow-up

Telephone follow-up with discharged patients has been proposed as one way to mitigate discharge communication problems. Although this approach is intuitively appealing, surprisingly few studies have been conducted of telephone follow-up at the time of discharge. Post-discharge telephone follow-up may also improve adherence, inform the hospital physician about the results of treatment or of adverse outcomes, and enable hospitalists to receive feedback from the patient and family.[3]

Improving Communications between IP and IO Providers

Discharge summaries or letters and telephone interchange are the key tools to optimize communication during these hand-offs and to reinforce continuity of care. Despite its documented deficiencies, including delays and inadequacies in information transfer, the discharge summary or discharge letter remains the main means of communication between IP physicians and primary care providers. Physicians rate discharge summaries highly if they are timely, concise, and contain focused discharge information. This information includes admission diagnosis, relevant physical examination findings, and laboratory results, procedures, hospital complications, discharge diagnosis, discharge medications, active medical problems, and follow-up. Using computerized discharge summaries promotes timeliness, increased patient satisfaction, cost effectiveness, efficiency, reduced error rate, and easier clinical auditing. Discharge information cards and associated discharge letters are favorably received by patients and

providers, and they better inform patients their illness and treatment than traditional discharge processes. Inter-physician communication by phone can contribute substantially to continuity and quality of patient care during the discharge process.[3]

Facilitating Discharge Planning

The cumulative impact of communication gaps and other coordination problems leaves patients less satisfied with hospital discharge planning than with any other aspect of hospital care. Discharge planning is defined as the development of an individualized discharge plan for a patient in anticipation of leaving the hospital for home or other post-discharge facility. The old adages that discharge planning starts upon admission seem more important today than ever.[3]

In this project, six sigma is used to improve the patient discharge process and to minimize the errors/ process cycle waiting time.

Six Sigma is a set of techniques and tools for process improvement. It was developed by Motorola in 1986, coinciding with the Japanese asset price bubble which is reflected in its terminology Jack Welch made it central to his business strategy at General Electric in 1995. Today, it is used in many industrial sectors.[4]

Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Champions", "Black Belts", "Green Belts", "Yellow Belts", etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified value targets, for

example: reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction, and increase profits.[4]

The term "six sigma" comes from statistics and is used in statistical quality control, which evaluates process capability. Originally, it referred to the ability of manufacturing processes to produce a very high proportion of output within specification. Processes that operate with "six sigma quality" over the short term are assumed to produce long-term defect levels below 3.4 defects per million opportunities (DPMO). Six Sigma's implicit goal is to improve all processes, but not to the 3.4 DPMO level necessarily. Organizations need to determine an appropriate sigma level for each of their most important processes and strive to achieve these. As a result of this goal, it is incumbent on management of the organization to prioritize areas of improvement.[4]

Six Sigma projects follow two project methodologies inspired by Deming's Plan-Do-Check-Act Cycle. These methodologies, composed of five phases each, bear the acronyms DMAIC and DMADV.[4]

- DMAIC is used for projects aimed at improving an existing business process.
- DMADV is used for projects aimed at creating new product or process designs.[4]

The DMAIC project methodology has five phases:

- *Define* the system, the voice of the customer and their requirements, and the project goals, specifically.
- *Measure* key aspects of the current process and collect relevant data.

- *Analyze* the data to investigate and verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered. Seek out root cause of the defect under investigation.
- *Improve* or optimize the current process based upon data analysis using techniques such as design of experiments, poka yoke or mistake proofing, and standard work to create a new, future state process. Set up pilot runs to establish process capability.
- *Control* the future state process to ensure that any deviations from the target are corrected before they result in defects. Implement control systems such as statistical process control, production boards, visual workplaces, and continuously monitor the process.[4]

Six Sigma is a business-driven, multi-dimensional structured approach to:

- Improving Processes
- Lowering Defects
- Reducing process variability
- Reducing costs
- Increasing customer satisfaction
- Increased profits [4]

The Purpose of applying six sigma in healthcare industry is: delays, measurement and medical errors and variability often undermine the delivery of safe, effective patient care. However, it is possible to minimize them by applying six-sigma. This methodology aims to focus on the root causes of healthcare problems, analyses them by flowcharts and fishbone diagrams and produces near perfect healthcare services. [5]

Problem definition

Presently hospitals in India are experiencing ongoing pressure to provide satisfactory care and the resources involved are having trouble realizing expectations. The increased demand for hospital beds is overwhelming, and freeing-up inpatient beds is a top priority. Therefore, delays in discharge planning and unsynchronized patient flows are not tolerable.

One of the problem was the inability to place the patients in the right bed (e.g. in the proper care unit) at the first attempt. The reason for that was mainly the unavailability of beds. The FOE is forced to place emergency admissions in less appropriate beds but available and then transfer them whenever it becomes possible. Numerous effects are caused by these unfortunate incidences, including reduced quality of care, reduced patient satisfaction, susceptibility of deterioration in patients' conditions. Other problem with the discharge process was slow billing process which resulted in lower patient satisfaction.

REVIEW OF LITERATURE

Theodore T. Allen, Shih-Hsien Tseng, Kerry Swanson, Wisconsin Mary Ann McClay, did a study on **"Improving the hospital discharge process using six sigma methods"** with the goal to streamline the patient discharge at community hospital using DMAIC. In this they had applied statistical process control (SPC) charting, process mapping, Pareto charting, and cause-and-effect matrices to make decisions. The findings suggested that focus should be on physician's preparation for discharge order writing and average discharge time was reduced from 3.3 to 2.8 hours (p=0.06) and missing chart data was reduced by 62%.[6]

Sigma Breakthrough Technologies did a case study on **"Improving inpatient discharge cycle time and patient satisfaction" in** columbus regional hospital and used the Lean Sigma methodology and DMAIC**.** The results showed that the cycle time was reduced from a baseline average of 202 minutes to 115 minutes and patient satisfaction level increased from a baseline of 47.6% (very good) to 76%.[7]

A study done by **Janita Vinaya Kumari** on **"A study on time management of discharge and billing process in tertiary care teaching hospital"** with the aim to find out the average time taken for the patient to be discharged in tertiary care hospital of Karnataka. The author used the registers designed for the study purpose and were kept in the ward and billing department. It was found out that the average time taken for the whole discharge process (Intra processing time + Inter processing time) for an individual patient was 2 hours and 22 minutes.[8]

Nancy Khurma did a study on **"Analysis, Modelling, and Improvement of Patient Discharge Process in a Regional Hospital"** and analyzed 1700 historical cases. Results revealed that the current process was inadequately defined, lack inconsistency, and its performance was hard to predict. It resulted in inpatient overstays and thus at least 8% of available hospital bed capacity was wasted. It was found that the key factors extending unnecessary patient stays were identified and used as predictors for individual patients. Another simulation model was created to explore the effects of standardizing parts of the discharge process. Results indicated that the process could be improved and there would be potential economic benefits by incorporating organizational changes (e.g., early involvement of social workers, improved information flow, close collaboration with external facilities accepting patients, etc.).[9]

Swapnil Tak, Sheetal Kulkarni, Rahul More did a study on **"A comparative time motion study of all types of patient discharges in a hospital"** with the aim of making discharge process more patient friendly and less time consuming as it was directly related to patient satisfaction. They did a observational study in a 350 bedded tertiary care hospital in Pune city on 354 discharged patients of all types discharges, which included Insurance patients (104), self-payment patients (227), & discharges against medical advice (DAMA) (23). It was found out that there was a delay in all types of discharges in all steps except for the time needed to return the medicines to the pharmacy and time and tedious discharge procedure was also responsible for patient dissatisfaction.[10]

OBJECTIVES

General:

To improve the patient discharge process in a hospital using DMAIC.

Specific:

- To determine the level of patient satisfaction based on the feedback provided by patients and attendants.
- To analyze discharge tracking sheet's data regarding process improvement
- To determine the reasons for poor patient satisfaction
- To recommend appropriate measures for process improvement

METHODOLOGY

The study was carried out in Yashoda Superspeciality Hospital, Kaushambi.

Type of study: Cross-sectional

Sample size: 1022 IPD feedback forms & 792 discharge patients data in discharge tracking sheets

Sampling Method: Convenience sampling

Data collection tool & technique:

Secondary data (IPD feedback forms) were collected for the period of three months i.e. from Dec'13-Feb'14 and primary data (discharge tracking sheets) was analyzed to know the flaws in the discharge process, were collected for the period of 2 months i.e. from March'14-April'14.

Study Period:

December'13-April'14

Statistical Analysis:

Discharge tracking sheets and feedback was collated with the help of MS excel and represented through Pareto chart & pie chart.

Attributes covered in IPD feedback form: Discharge process

Under this attribute, following parameters were studied:

Timely discharge as per the time frame informed to you, timely & accurate billing was done & explained & post discharge instructions & medications were well explained.

LIMITATIONS

- The study is subjected to the understanding, bias and prejudices of the respondent.
- It is very difficult to seek response from patient because patients are reluctant and annoyed to respond.
- It is difficult to track, time of final approval letter for TPA patients, if the approval is coming by fax, which in turn causes difficulty in calculating the TAT for that patient.

DATA ANALYSIS AND FINDINGS

The study began in Feb'14 and DMAIC methodology was used to improve the patient discharge process.

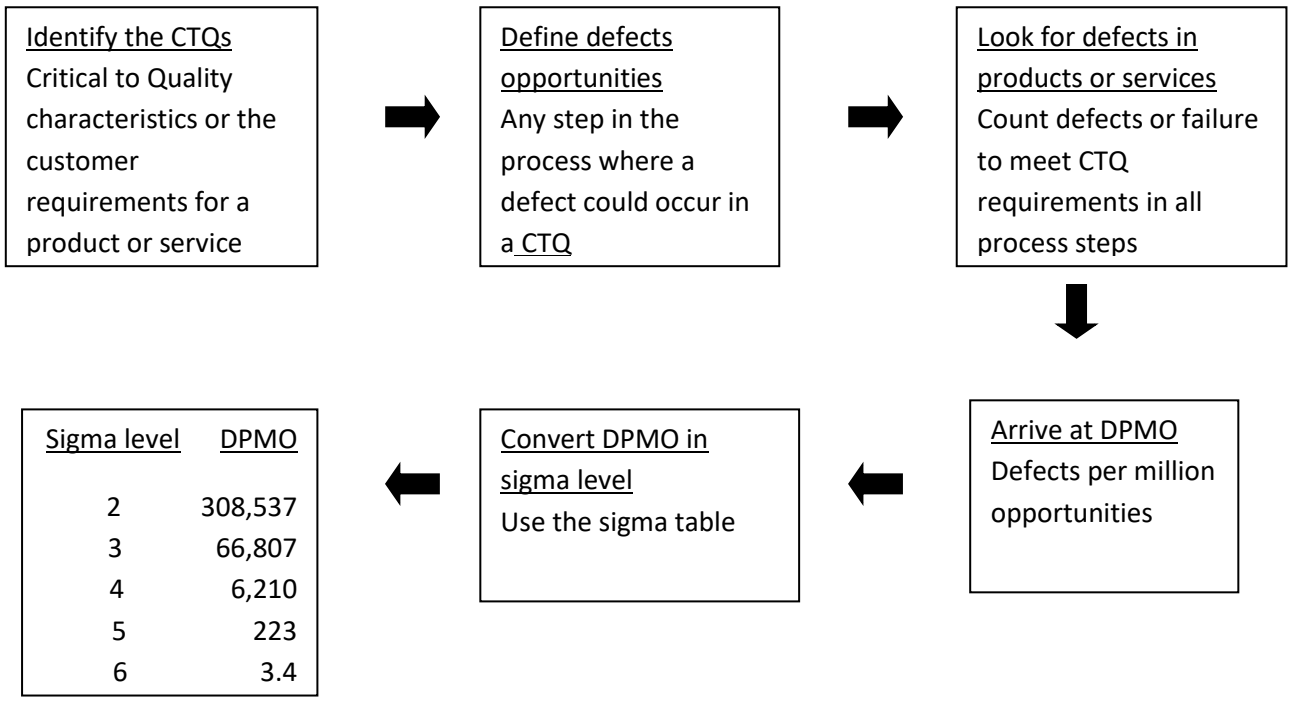

Fig 1.1 shows the measurement system: how to arrive at sigma level [11]

Six sigma methodology has five phases (DMAIC): define, measure, analyze, improve and control.

Define:

This is the first step that refers to defining the goals of the project. In this we identify potential benefits and critical to quality ("CTQ") factors.

CTQ factor in this project is the less waiting time in discharging a patient, time the treating doctor writes discharge order to final settlement of discharge, which will result in greater patient satisfaction.

The discharge process defined by YHK is as follows:

1. Discharge Decision:

Decision regarding discharging the patients rest with the primary treating consultant of the patient who make such decision during his evening rounds on the previous day prior to the discharge of patient and the same is communicated to the patient, relatives ,the concerned ward nursing staff / on duty Medical Officer. However the final decision regarding discharge is made on the basis of the condition of the patient during the morning round of the primary consultant on the scheduled day of discharge.

On the scheduled day of discharge the primary treating consultant during his morning rounds examines the condition of the patient to ascertain whether the patient can be discharged. After conforming the patients fit to be discharged on that day the same is communicated to ward nurse and the medical officer on duty.

2. Preparation of Discharge Summary

After final decision to discharge the patient is taken, the treating consultant prepares the discharge summary of the patient which contains the following information:

- Patient's name, UHID (reg. No. & IP no.), date of admission and discharge
- Reason for admission & summary of significant findings
- Diagnosis
- Course of stay in hospital
- Important special & imaging investigations
- Details of conservative/ surgical treatment given with operative findings
- Condition on discharge with follow up advice
- Discharge medication
- Instructions about when and how to obtain urgent care with the Emergency Contact Number.

One copy of the Discharge Summary is handed over to the patient/relatives and the other copy is attached to the patient's case file.

As per the instructions of the treating consultant in the Discharge Summary, patient relatives are advised by the Ward nurse to collect the medicine from the pharmacy.

3. <u>Final Billing for Patient getting discharge</u>

In case of discharge of patients, ward nurse forwards the Patient File along with the Discharge summary to the Billing Department for clearance.

- All the services availed by the patient are charged as per the entitled tariff according to the billing policy.

- Billing department prepare the final bill of the patient adjusting the advance paid by the patient/relatives at the time of admission. In case any refund has to be made the same is done or the balance if any is collected from the patient / relatives at the billing counter.

- In case of corporate patients final bill is made and essential documents are collected and checked from patient. Documents and bills are signed off by the patient/ attendant as per the empanelment rules. Patient bill is settled in credit to company as per rules and followed for claim from respective corporate. and followed for

- In case of Insurance patients, in order to avail cashless facility, final bill along with discharge summary and essential information, if any are sent to TPA for final approval. If Final approved amount is less than the final bill amount, the balance is paid by patient including the charges of non payable services and approved amount is credited to Insurance Company and followed for claim with necessary documents.

- Once the final settlement of the billing is done, a payment receipt is prepared and handed over to the patient/relatives and a copy of the same is forwarded to the ward nurse who enters the same in the designated register maintained in the ward.

4. Patient Counseling:

Prior to final discharge of patient from the hospital the ward nurse counsels the patient regarding the medications , follow up procedure etc as mentioned in the discharge summary. Patient follow up visit dates are clearly informed. Patients discharge records are entered in the Ward Admission /Discharge register.

Patient along with the relatives leave the hospital. In case of old patients, delivery patients etc they are taken to the hospital exit area in wheel chairs by the ward attendants and seen off.

5. Leave against Medical Advice (LAMA)/ Discharge on request (DOR)

Incase patient/relatives want to get discharged against medical advice/ Discharge on request; the same is indicated in the patients case record by the primary treating consultant/medical officer and the consequences of this action are explained to the patient/ attendant. Records are entered in the LAMA register of the respective patient ward and a written consent is taken from the patient/relatives.

Discharge Summary is prepared and the above mentioned steps are followed.

6. Patient Expiry

In case of expiry of the patient the primary treating consultant/medical officers/nursing staff informs the patient relatives. Patients relatives are allowed time with the body.

Ward nurse makes necessary preparation for cleaning the body. Body is cleaned by designated staff and wrapped in clean sheet. The on duty medical officer prepares two copies of the Death Information and the Death Summary as well as three copies of Medical Certificate for Cause of Death. The Death Information and Death Summary is stamped .Body handed over to the patient relatives or kept in the mortuary within an hour of death .Body handed over to the relatives along with one copy of Death Summary and Death Information and the other copy is attached to the patient case records.

In case of medico legal cases the local police station is informed and they decide the need for postmortem.

Discharge Process

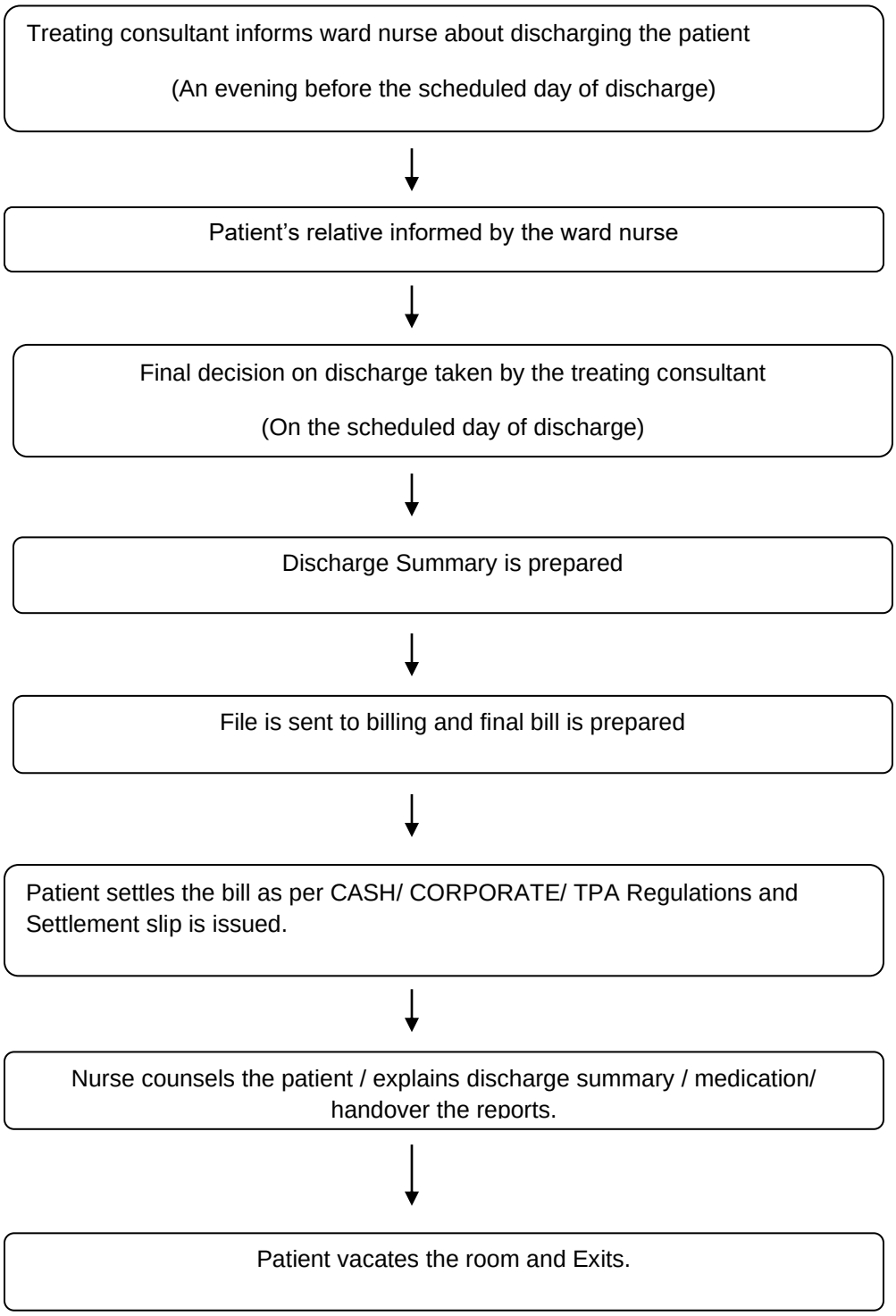

Fig. 1.2 Discharge process of Yashoda Hospital, Kaushambi

7. Records Generated:

- Patient Case File
- Discharge Summary
- Death Information
- Death Summary
- Medical Certificate for Cause of Death
- LAMA Register
- LAMA consent form
- Admission Discharge Register
- Final Bill

TAT for the discharge Process:

According to the YHK, TAT should be less than 195 minutes i.e. 3hr and 15 minutes and it is according to the last 3 years of data.

MEASURE:

This phase refers to the analysis of the existing system with various measurement techniques for the defects and levels of perfection that exist.

A Six Sigma defect is defined as anything outside of customer specifications.

A Six Sigma opportunity is the total quantity of chances for a defect.

First we calculate Defects per Million Opportunities (DPMO) and based on that a Sigma is decided from a predefined table:

This is the method used for measuring results as we proceed through a project. This beginning point enables us to locate the cause and effect of those processes and to seek defect point so that the procedure can be improved.

IDENTIFICATION OF DEFECTS AND OPPORTUNITIES

1. WAITING TIME

DEFECT: A defect is defined as any process output that does not meet customer specifications, or the total number of failed opportunities. In this particular case the defects are the number of patients having to wait more than the specified TAT.

Opportunities which can turn into defects are as follows:

- Slow billing process
- Discharge summary not made on time by Duty doctor/ Paediatric SR/ Gynaecologist SR
- In case of delivery cases, waiting for baby's discharge notification
- Giving priority to TPA patient's billing
- Delay in returning medicines
- In case of planned discharge, wait for consultant's round in the morning.

The data analysis began in the month of Feb'14. IPD feedback forms, which were given to patients/ patient's attendants at the time of discharge, were analyzed for the period of three months i.e. December'13-February'14. Total of 1022 feedback forms were analyzed.

The collected data was analyzed on MS excel and is presented with statistical charts and diagram.

Collective scores of different parameters for which average score was calculated.

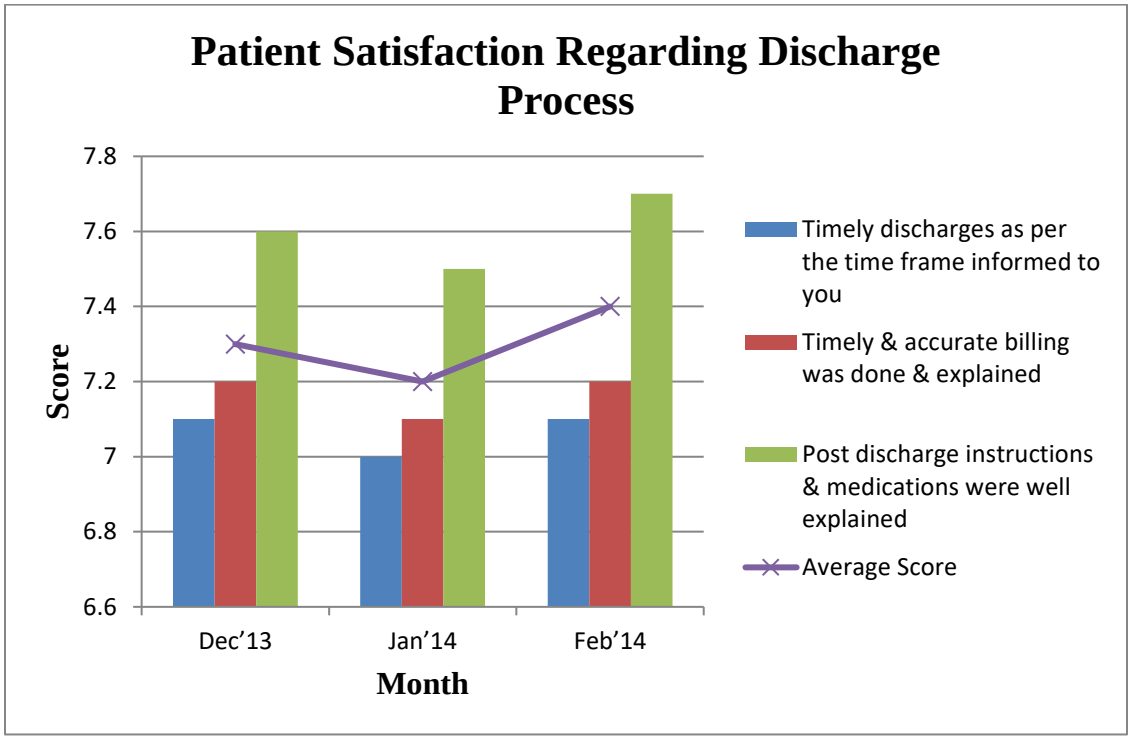

Fig. 1.3 Level of patient satisfaction regarding discharge process

On the basis of the responses of the patients, it was found out that one of the main reasons for delay in discharge of patient lied in delay in discharging a patient in specified time frame, which was informed to patient. On an average patient satisfaction was 73% regarding the discharge process of hospital.

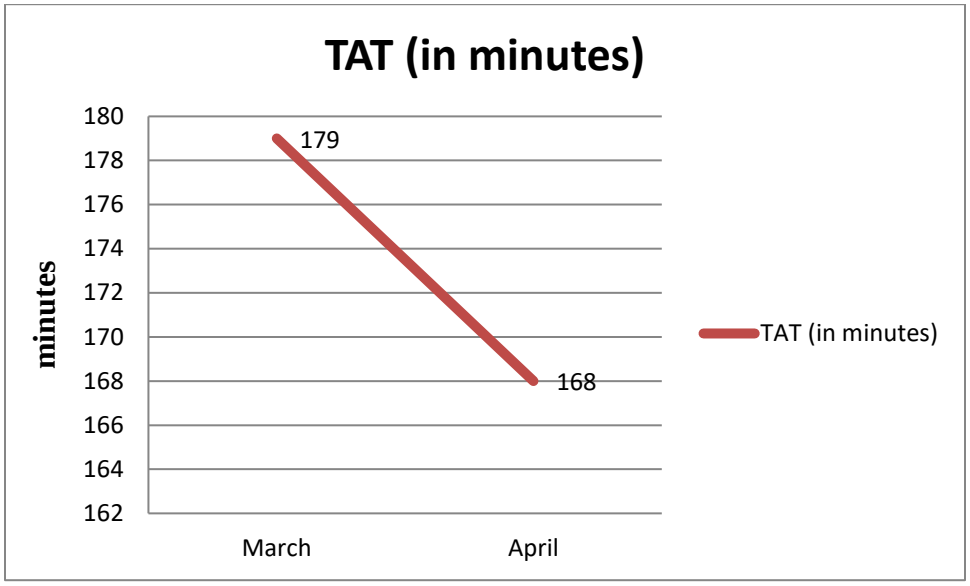

Fig 1.4 showing the trend of discharge process TAT

It was observed that in the month of March'14, the TAT for discharge process was 179 minutes and in April'14 it was 168. A decrease of 11 minutes was seen in the TAT of discharge process.

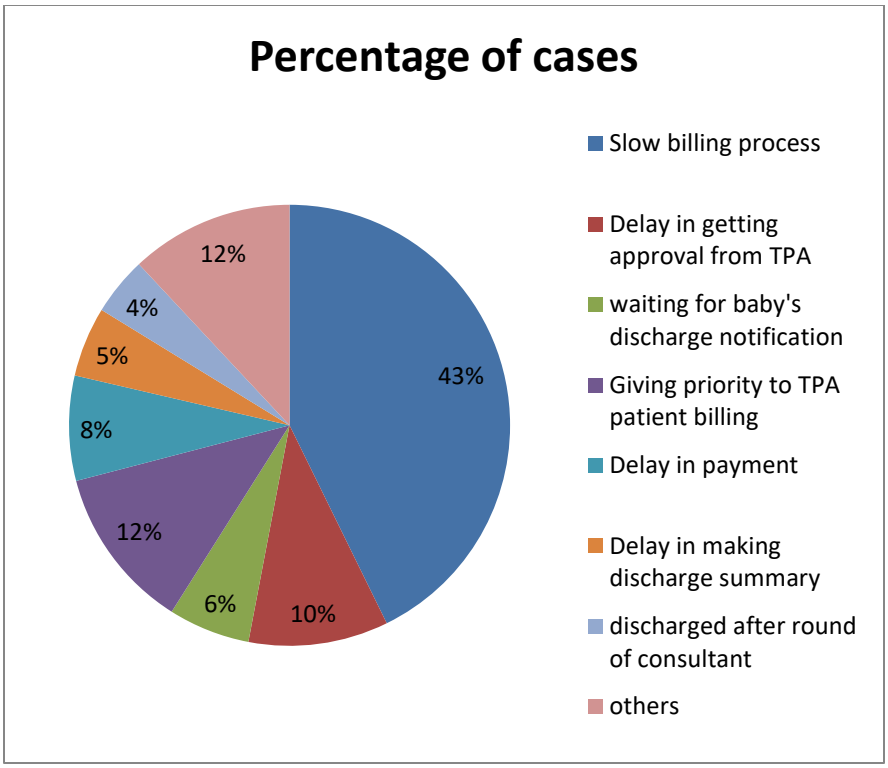

Fig 1.5 Percentage of cases and reasons for delay in discharge process

It was observed that one of the main reason for delay in discharge process was slow billing process which contributed to 43% of the cases, 12% delays were due to the making of TPA bills on priority basis, 10% cases were of delay in getting final approval from TPA.

Calculation of DPMO and Sigma level

Total number of defects= 271

Total number of opportunities= Total data available x Number of opportunities

Total data available= 792

Number of opportunities= 6

Total number of opportunities= 792 x 6= 4752

Defects Per Opportunity- DPO

$$DPO = \frac{\text{Total Number of Defects}}{\text{Total Opportunity}}$$

DPO= 271/4752= 0.0570

Defects Per Million Opportunities-DPMO

DPMO= DPO x 1, 000,000

DPMO= 0.0570 x 1, 000,000= 57000

Defects Per Million Opportunities or DPMO can be then converted to sig ma values using Yield to Sigma Conversion Table.

Sigma Level= 3 sigma level

ANALYSE

The analyze phase was undertaken to determine any disparity that may exist in the goals set and the current performance levels achieved. The understanding of the relationship between cause and effect is necessary to bring about any improvements, if needed.

*Analyze phase seeks to discover root causes of the major contributes to the problem.

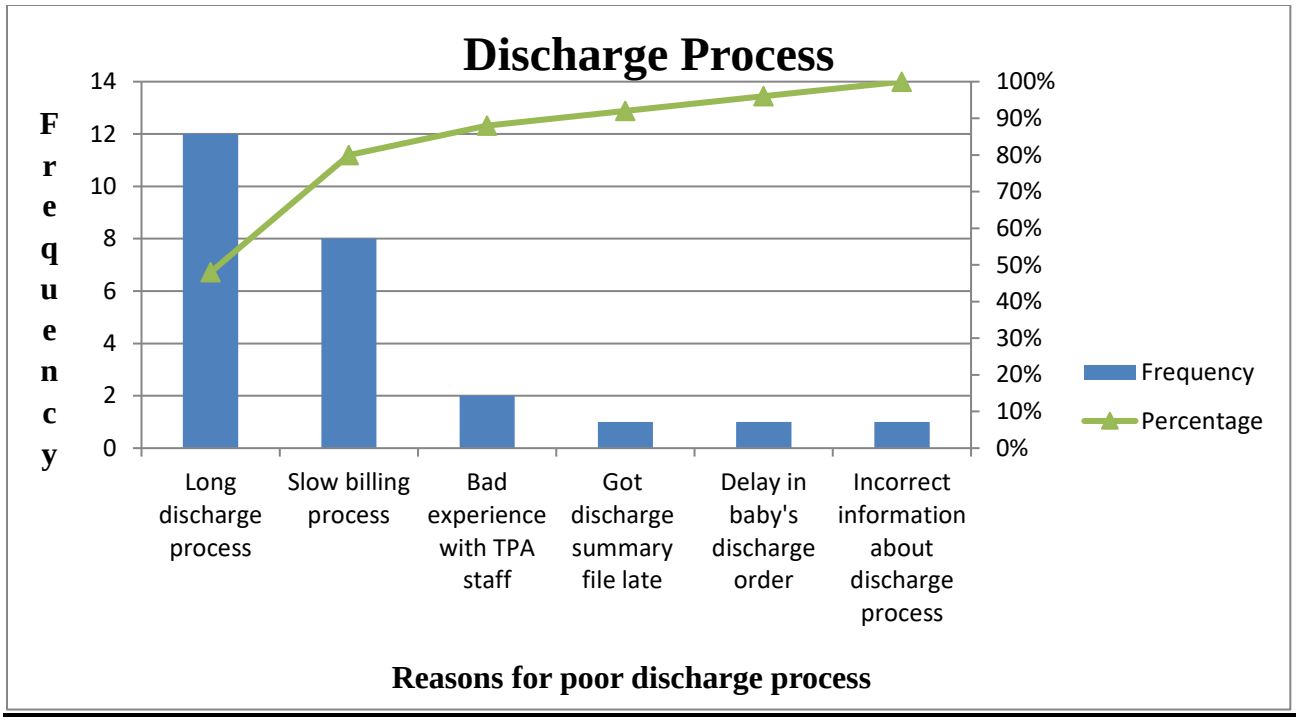

Fig. 1.6 Pareto analyses of complaints for discharge process

From the above figure it is observed that long discharge process, slow billing process are 20% of the causes which is contributing to the 80% effect.

Discharge Tracking sheets were analyzed for the period of March'14 to April'14. During this period 792 patients were discharged from the hospital. The data was analyzed with the help of MS excel and represented through graphs, pie charts etc.

RCA (Root Cause Analysis)

Brainstorming session was carried out and all the causes were listed in the Fish Bone Diagram.

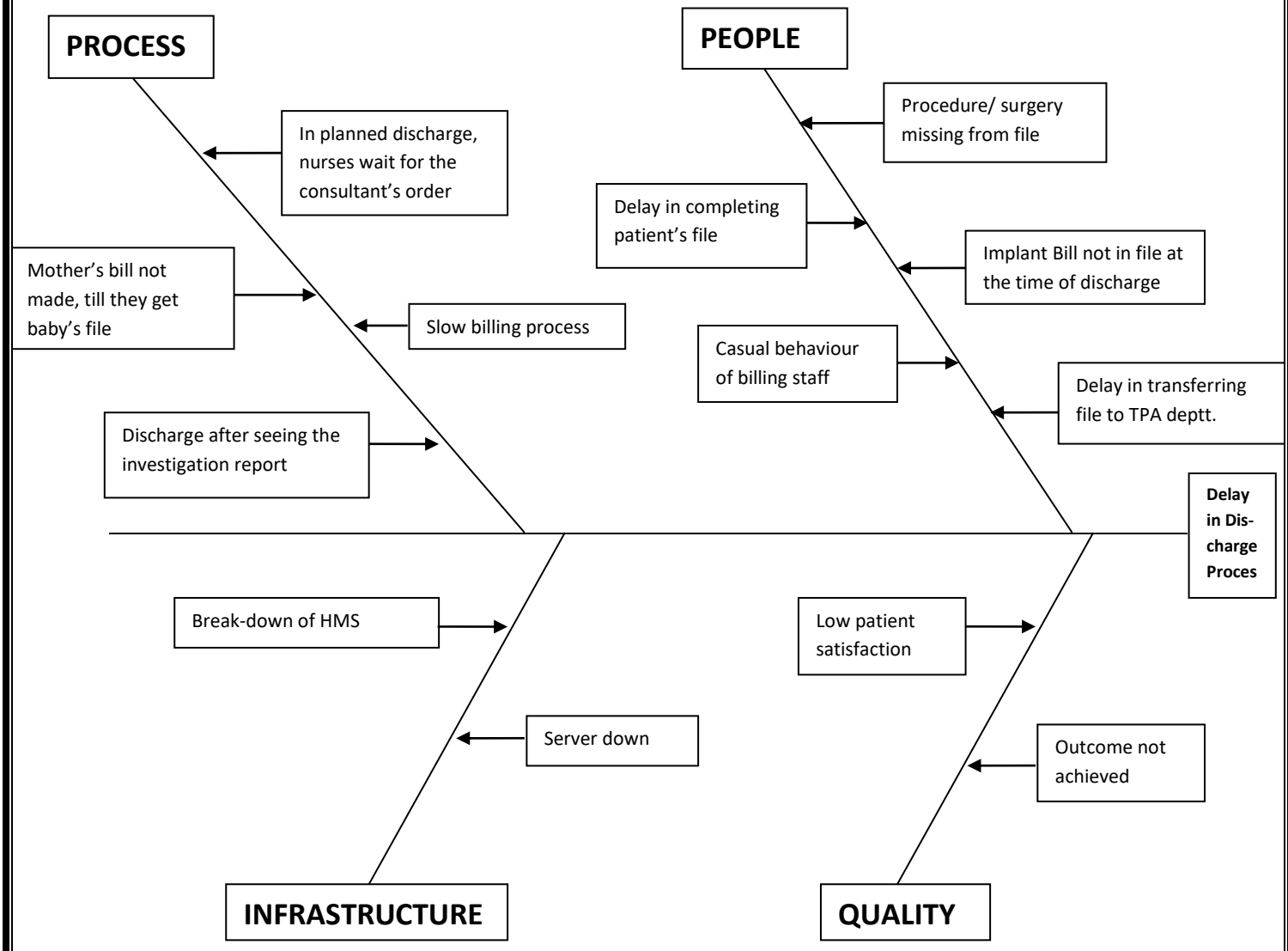

Fig. 1.7 RCA of discharge process

Failure modes and effects analysis (FMEA) is a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.

"Failure modes" means the ways, or modes, in which something might fail. Failures are any errors or defects, especially ones that affect the customer, and can be potential or actual.

"Effects analysis" refers to studying the consequences of those failures.[12]

Failures are prioritized according to how serious their consequences are, how frequently they occur and how easily they can be detected. The purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones.[12]

Failure modes and effects analysis also documents current knowledge and actions about the risks of failures, for use in continuous improvement. FMEA is used during design to prevent failures. Later it's used for control, before and during ongoing operation of the process. Ideally, FMEA begins during the earliest conceptual stages of design and continues throughout the life of the product or service.[12]

FMEA for Discharge Process								
Process	**Potential Failure Mode**	**Potential Effects of Failure**	**S (Severity rating)**	**Potential Cause(s)**	**O (Occurance Rating)**	**D (Detection Rating)**	**RPN (Risk Priority Number)**	**Recommended actions**
In case of planned discharge, discharge summary to be made by Duty doctor before the day of discharge	Duty doctor/ SR busy in rounds	Delay in making discharge summary	5	Duty doctor/ SR not informed about plan discharge	4	3	60	Inform duty doctor/SR before time or in night before the day of discharge
Consultant/ duty doctor/Nurses/Other Technicians to write all procedures, performed on patient, in file as well as in activity sheet	Sr/Consultant/Nurses/Other Technicians forgot to mention procedure in file/discharge summary/activity sheet	Delay in making discharge summary	5	Consultant/SR/ Nurses/Other Technicians might be busy or forgot to mention the procedure	2	1	10	(1) SR/billing staff or TPA staff should check for all the procedures in bill before sending the bill to the concerned TPA company. (2) since nurses send all activity sheets of current day in billing deptt., so they should check for all procedures in the activity sheets before sending them in the billing deptt.
In case of planned discharge, discharge file to be sent in Quality cell/ In-patient billing deptt. On time (before 11:30 am)	(1) Nurses wait for Consultant to visit the patient before sending the file in billing deptt. (2) GDA not available for transfering the file from ward to IP billing deptt.	Delay in making discharge summary & bill as well as sending file in TPA deptt	5	(1) Perception of nurses that consultant might cancel the discharge order (2) shortage of GDA staff.	4	3	60	Discharge co-ordinator should laison with consultants for sending the file in IP billing deptt before they come
Medicines should be returned before sending the file in IP billing deptt.	(1) Nurses are busy in morning rounds with consultants or busy in indenting medicines for patients. (2) GDA not available in ward. (3) Rush in Pharmacy	Delay in returning medicines to pharmacy, hence delay in finalising bill & discharging patient	3	(1) Nurses are involved in both direct & indirect nursing care, hence too much of work load on them. (2) Pharmacy staff busy in giving medicines to OPD patients or giving medicines for terminally ill patients.	3	2	18	Since there are atleast 2 nurses at 1 nursing station at a time, so 1 nurse can return medicines & other can do rounds with consultants.
All in-patient bills to be updated in the system	Implant bill not in file or bills are not updated	Delay in getting the implant bill from the vendor at the time of discharge	5	Negligence of billing staff	2	3	30	Billing staff in night should update all the IP bills in night
TPA files should be sent in TPA deptt on time (i.e discharge time should not be more than 195 mins	In case of delivery cases, mother & baby's file come separately in billing deptt or TPA staff came late in morning	Delay in getting final approval from the concerned TPA	5	Casual behaviour of IP billing staff, not making bills on time; Documents not completed in patient's file (ID proof)	4	3	60	TPA files should be sent in TPA deptt as soon as possible; TPA staff should check for all the documents

Fig 1.8 FMEA of discharge process

IMPROVE:

To identify potential solutions that will eliminate root causes.

- Inform Duty Doctor/Gynaecologist SR/Paediatric SR about the discharge a day before for preparing the discharge summary
- Liaison with consultants regarding the plan discharge. The discharge co-ordinator should contact the concerned consultant in morning before their rounds, whether to send the file in in-patient billing department or not.
- The in-patient bills should be updated every day in night. The personnel in the billing department should update all the activity sheets of the in-patients in the software (HMS) so that it would take less time in making bill at the time of discharge.
- Medicines should be returned before sending the file in billing department.
- In case of any surgery, the implant bill should be taken from the vendor before the day of discharging the patient.

These recommendations were followed in the month of April'14 and now also YHK is following these measures to reduce the TAT of discharge process. By following these measures the TAT have been reduced and are able to achieve the benchmark of 195 mins except in case of TPA patients whose TAT is still more than 195 mins.

CONTROL:

- A control plan can be put in place to ensure that these improvements would continue in the future. Control charts can be used to monitor ongoing performance of the key variables. With a highly people-dependent process, the control chart can be an essential tool to verify compliance.
- **Audit the control**

- Routine reporting of result is maintained
- Clear documentation of control is done

DISCUSSION

After collecting the data (IPD feedback forms & discharge tracking sheets) and analysing it, the findings were as follows:

- Out of the three parameters of discharge process in IPD feedback form, it was observed that "timely discharge as per the time frame informed to you" has scored the least average score (7) whereas "post discharge instructions & medications were well explained" has scored the highest (8). Most of the complaints are being raised because of long discharge process, slow billing process, bad experience with TPA staff; no proper information regarding discharge was given, got discharge summary file late after payment of bill, after the intimation of mother's discharge, waited for long for child doctor.
- Overall patient satisfaction was 73% regarding the discharge process of hospital. Patient satisfaction regarding discharge process in the month of Dec'13 was 73%, Jan'14 it was 72% and in Feb'14 it was 74%.
- Discharge tracking sheets analyzed and it was observed that in the month of March'14, TAT was 179 minutes and in April'14 it was 168 minutes. It was also observed that in March'14, TAT was higher for all types of patients (private, Government panel, TPA) but in April'14, after following the recommendations, the TAT was generally higher for TPA patients and it was within the benchmark (less than 195 mins) of the YHK for other types of patients.
- The reasons for higher TAT was because of slow billing process, delay in getting approval from TPA, in case of delivery cases, waiting for baby's discharge notification,

giving priority to TPA patients while billing, delay in making discharge summary by duty doctor/paediatric SR/gynaecologist SR, in case of planned discharges, nurses wait for consultant's morning rounds for discharging patients.

- After doing RCA of the problem, it was observed that because of the casual behaviour of the personnel involved in the discharge process, infrastructural issues like breakdown of HMS, server down etc., causes hindrance in achieving the target.
- FMEA was done to know the failure modes and their effects on the process and accordingly severity, its occurrence and level of detection was determined. The higher the RPN, the more justification and mitigation is needed to provide evidence and lower the risk to an acceptable level.

CONCLUSION

In this project, DMAIC approach was applied to streamline patient discharge at the hospital. Several tools are used including process mapping, Pareto charting, RCA and FMEA to analyze and solve the problem. It was found out that after following the recommendations, reduction in the average discharge time from 3hrs to 2 hr 49 mins was seen in 30 days. A particularly obdurate issue, slow billing process, continues to perplex the hospital and accounts for most of the variability in current discharge time.

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ANNEXURE

Rating scale foe FMEA

SEVERITY (S)

Rating scale	Meaning
I	No relevant effect on the discharge process
II	very minor effect on the discharge process
III	Minor effect on the discharge process
IV	Moderate effect on the discharge process
V	Critical on the discharge process

Probablity

Rating scale	Meaning
A	Extremely unlikely (virtually impossible)
B	Remote (relatively few episodes of occurance)
C	Occasional
D	Resonably possible
E	Frequent (failure in discharge process is inevitable)

Detection	
Rating scale	**Meaning**
1	Certain- delay in discharge process will be detected on doing RCA
2	Almost certain
3	High
4	Moderate
5	Low